I CLAIM:

1. A prosthetic implant for replacing a nucleus pulposus of an intervertebral disk comprising:

an upper endwall and a lower endwall, each of said endwalls having a discoid cross-section and a periphery, and having an antero-posterior diameter and a transverse diameter, said antero-posterior diameter being greater than said transverse diameter; and

an hourglass-shaped sidewall connecting said peripheries of said upper endwall and said lower endwall; whereby an interior volume is enclosed between said upper endwall, said lower endwall and said sidewall;

said interior volume being filled with a substantially incompressible liquid or soft plastic material.

2. The prosthetic implant of Claim 1 wherein said interior volume is filled with an aqueous normal saline solution.

3. The prosthetic implant of Claim 1 wherein said interior volume is filled with a biocompatible oil.

4. The prosthetic implant of Claim 1 wherein said interior volume is filled with a synthetic hyaluronic acid/proteoglycan composition.

5. The prosthetic implant of Claim 4 wherein said synthetic hyaluronic acid/proteoglycan composition has a modulus in a range of 0 Mpa to about 4 Mpa.

6. The prosthetic implant of Claim 1 wherein said interior volume is filled with a soft biocompatible synthetic polymer having a modulus in a range of 0 Mpa to about 1 Mpa.

7. The prosthetic implant of Claim 1 wherein said upper and lower endwalls and said sidewall are made of a biocompatible synthetic polymer.

8. The prosthetic implant of Claim 7 wherein said biocompatible synthetic polymer has a durometer hardness in a range of A80 to D65.

9. The prosthetic implant of Claim 7 wherein said biocompatible synthetic polymer is a polycarbonate-polyurethane blend.

10. The prosthetic implant of Claim 9 wherein said polycarbonate polyurethane blend has a durometer hardness in the range of A80 to D65.

11. The prosthetic implant of Claim 1 wherein said endwalls have a thickness greater than a thickness of said sidewall.

12. The prosthetic implant of Claim 1 wherein said biocompatible polymer of said endwalls has a durometer hardness greater than a durometer hardness of said biocompatible polymer of said sidewall.

13. The prosthetic implant of Claim 1 wherein said upper endwall has an outward convex curvature.

14. The prosthetic implant of Claim 13 wherein said outward convex curvature of said upper endwall is matched

to a curvature of a vertebral endplate with which it comes into contact.

15. The prosthetic implant of claim 13 wherein said convex curvature of said upper endwall has an apex spaced from a plane defined by said periphery by a distance in a range of about 1 mm to about 3 mm.

16. The prosthetic implant of Claim 7 wherein said upper endwall has an outward convex curvature and said biocompatible synthetic polymer has a hardness sufficient to maintain said outward convex curvature in use.

17. The prosthetic implant of Claim 7 wherein said upper endwall has an outward convex curvature and has a thickness sufficient to maintain said outward convex curvature in use.

18. The prosthetic implant of Claim 1 wherein said lower endwall has an outward convex curvature.

19. The prosthetic implant of Claim 18 wherein said outward convex curvature of said lower endwall is matched

to a curvature of a vertebral endplate with which it comes into contact.

20. The prosthetic implant of claim 18 wherein said convex curvature of said lower endwall has an apex spaced from a plane defined by said periphery by a distance in a range of about 0.5 mm to about 2.5 mm.

21. The prosthetic implant of Claim 13 wherein said upper endwall has an outward convex curvature and said biocompatible synthetic polymer has a hardness sufficient to maintain said outward convex curvature in use.

22. The prosthetic implant of Claim 13 wherein said upper endwall has an outward convex curvature and has a thickness sufficient to maintain said outward convex curvature in use.

23. The prosthetic implant of Claim 7 wherein said sidewall is made of a softer synthetic polymer than said endwalls.

24. The prosthetic implant of Claim 7 wherein said sidewall is made of a thinner material than said endwalls.

25. The prosthetic implant of Claim 1 wherein each of said endwalls has an area in a range of about 30% to about 60% of an area of a vertebral endplate which it is intended to contact .

26. The prosthetic implant of Claim 1 wherein said internal volume has a narrowest transverse cross-sectional area in a range of about 20% to about 80% of a transverse cross-sectional area of said upper endwall.

27. The prosthetic implant of Claim 1 wherein said internal volume has a narrowest transverse cross-sectional area in a range of about 20% to about 80% of a transverse cross-sectional area of said lower endwall.

28. The prosthetic implant of Claim 1, additionally comprising at least one stabilizing cord attached to said implant.

29. The prosthetic implant of Claim 28, wherein said stabilizing cord is attached to said sidewall of said implant.

30. The prosthetic implant of Claim 28, wherein said hourglass-shaped sidewall has a waist region and said stabilizing cord is attached to said waist region of said hourglass-shaped sidewall.

31. The prosthetic implant of Claim 28, wherein said prosthetic implant additonally comprises a pair of stabilizing cords attached to said implant at opposite ends of a diameter of said implant.

32. The prostheic implant of Claim 30, wherein said prosthetic implant has a pair of said stabilizing cords attached to said waist region of said sidewall at opposite sides of said sidewall.

33. A total prosthesis for replacing the entire human intervertebral disk comprising,

a polymer core comprising an annulus surrounding a central cavity said annulus having upper and lower and side

surfaces and made of a first biocompatible material and being shaped and sized to approximate the annulus fibrosus of a natural intervertebral disk, the first biocompatible material being an elastomer having a elastic modulus approximating that of the annulus fibrosus of the natural human intervertebral disk;

upper and lower transitional plates affixed respectively to the upper and lower surfaces of the annulus , the upper and lower transitional plates being made of a second biocompatible material having a durometer hardness greater than that of the first biocompatible polymer; and

upper and lower endplates adapted to contact adjacent vertebrae and affixed respectively to the upper and lower transitional plates.

34. The total prosthesis of Claim 33, wherein said first biocompatible material is a first elastomeric synthetic polymer.

35. The total prosthesis of Claim 34, wherein said first elastomeric synthetic polymer is a first polycarbonate-thermoplastic polyurethane blend.

36. The total prosthesis of Claim 34, wherein said first elastomeric synthetic polymer has a durometer hardess in a range of about Shore A70 to about Shore A90.

37. The total prosthesis of Claim 34, wherein said first elastomeric synthetic polymer has an e-value in a range of about 3-16 megapascals.

38. The total prosthesis of Claim 33, wherein said second biocompatible material is a second elastomeric synthetic polymer.

39. The total prosthesis of Claim 38, wherein said second elastomeric synthetic polymer is a second polycarbonate-thermoplastic polyurethane blend.

40. The total prosthesis of Claim 38, wherein said second elastomeric synthetic polymer has a durometer hardness in a range of about Shore A100 to about Shore D65.

41. The total prosthesis of Claim 33, wherein said central cavity has an hourglass shape.

42. The total prosthesis of Claim 33, wherein said central cavity has a volume comprising about 20% to about 50% of the volume of said polymer core.

43. The total prosthesis of Claim 33, wherein said annulus has a volume comprising about 50% to about 80% of said polymer core.

44. The total prosthesis of Claim 33, wherein said cavity is filled with an incompressible liquid.

45. The total prosthesis of Claim 33, wherein said cavity is filled with a biocompatible polymer having an e-value of about 1-4 megapascals.

46. The total prosthesis of Claim 33, wherein each of said transition plates are molded to said upper and lower surfaces of the annulus.

47. The total prosthesis of Claim 33, wherein each of said transition plates has a domed outer surface.

48. The total prosthesis of Claim 33, wherein said transition plates have thickness dimension at a posterior edge of about 1-3 mm.

49. The total prosthesis of Claim 33, wherein said transition plates have thickness dimension at an anterior edge of about 4-7 mm.

50. The total prosthesis of Claim 33, wherein said each of said endplates has an inner surface shaped to contact said domed outer surface of said transitional plate.

51. The total prosthesis of Claim 33, wherein each of said endplates has a projection at a posterior edge shaped to form a groove for receiving a posterior edge of a transition plate.

52. The total prosthesis of Claim 33, wherein each of said endplates has a domed shape having a vertex.

53. The total prosthesis of Claim 52, wherein said domed shape of said upper endplate has a maximum depth of curvature of about 1.5-2.5mm.

54. The total prosthesis of Claim 53, wherein said maximum depth of curvature of said domed shape is located at a point spaced from an anterior edge of said endplate by a distance of about 60% of an antero-posterior diameter of said endplate.

55. The total prosthesis of Claim 52, wherein said domed shape of said lower endplate has a maximum depth of curvature of about 0.6-2.0mm.

56. The total prosthesis of Claim 55, wherein said maximum depth of curvature of said domed shape is located at a point spaced from an anterior edge of said endplate by a distance of about 60% of an antero-posterior diameter of said endplate.

57. The total prosthesis of Claim 33, wherein an outer surface of at least one of said endplates is provided with a surface texture adapted for bone ingrowth.

58. The total prosthesis of Claim 57 wherein at least one of said endplates is provided with a fin upstanding from said outer surface and extending away from said anterior edge along a lateral midline of said outer surface.

59. The total prosthesis of Claim 33, wherein at least one of said endplates comprises a main endplate and an anterior extension plate.

60. The total prosthesis of Claim 59, wherein said anterior extension plate is provide with a fin upstanding from an outer surface thereof and adapted to interact with said fin on said main endplate.

61. The total prosthesis of Claim 59, wherein said anterior extension plate is provided with a wall extending generally perpendicular to an inner surface of said

anterior extension plate and adapted to contact an anterior edge of said transition plate.

62. The total prosthesis of Claim 59, wherein said main endplate, said transition plate, and said anterior extension plate are each provided with sleeves at lateral edges thereof adapted to receive screws cooperating with said sleeves to fasten said main endplate, said transition plate and said anterior extension plate together.

63. The total prosthesis of Claim 59, wherein said main endplate, said transition plate, and said anterior extension plate are each provided with appendages at lateral edges thereof adapted to receive a tightening cable to fasten said main endplate, said transition plate and said anterior extension plate together.

64. The total prosthesis of Claim 33, wherein said transition plate is provided with a recess having a forward wall located at a distance from posterior edge of said transition plate and extending from said forward wall to said posterior edge.

65. The total prosthesis of Claim 64, wherein said forward wall is generally straight and extends across said transition plate generally perpendicular to an antero-posterior diameter of said transition plate.

66. The total prosthesis of Claim 64 wherein said forward wall is spaced from said posterior edge of said transition plate by a distance of about one-fourth to one-half of an antero-posterior diameter of said transition plate.

67. The total prosthesis of Claim 64, wherein said endplate is provided with a projection having a forward wall located at a distance from posterior edge of said transition plate and extending from said forward wall to said posterior edge, said projection shaped to match said recess in said transition plate.

68. The total prosthesis of Claim 64, wherein said forward wall is generally straight and extends across said endplate plate generally perpendicular to an antero-posterior diameter of said endplate.

69. The total prosthesis of Claim 64 wherein said forward wall is spaced from said posterior edge of said endplate plate by a distance of about one-fourth to one-half of an antero-posterior diameter of said endplate.

70. The total prosthesis of Claim 33, wherein at least one of said endplates is provided with at least one elastic appendage extending inwardly from a periphery of said endplate and adapted to fit into a corresponding recess in at least one of said transitional endplates to affix said endplate to said transitional plate.

71. The total prosthesis of Claim 70, wherein said at least one of said endplates is provided with a plurality of said elastic appendages.

72. The total prosthesis of Claim 71, wherein said elastic appendages are provided with grooves for receiving a tightening cable.

73. The total prosthesis of Claim 71, wherein at least one of said transition plates has an outer surface and an inner surface and a peripheral wall extending

between said outer surface and said inner surface, and said peripheral wall is provided with at least one said recess for engaging said elastic appendage of said endplate.

74. The total prosthesis of Claim 72, wherein said peripheral wall of said transition plate is provided with a peripheral groove for receiving said appendages.

75. The total prosthesis of Claim 33 wherein each of said endplates has an area in a range of about 30% to about 100% of a vertebral endplate which it is adapted to contact.

76. The total prosthesis of Claim 33 wherein each of said endplates has an area in a range of about 30% to about 80% of a vertebral endplate which it is adapted to contact.